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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,994	10/03/2003	Hiroyuki Shimada	59521 (48229)	8918
21874	7590	10/31/2005	EXAMINER	
EDWARDS & ANGELL, LLP P.O. BOX 55874 BOSTON, MA 02205			CHEN, KIN-CHAN	
			ART UNIT	PAPER NUMBER
			1765	
DATE MAILED: 10/31/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/678,994	Applicant(s) SHIMADA, HIROYUKI	
	Examiner Kin-Chan Chen	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,5 and 7-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5 and 7-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Applicant's amendment (such as claims 1 and 5) necessitated the new ground(s) of rejection presented in this Office action.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 4, 7, 8, 10, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzawa et al. (US 6,773,996).

In a method for semiconductor device fabrication, Suzawa teaches that an insulating layer may be formed above a semiconductor layer. A conductive layer including at least one of a tantalum layer and a tantalum nitride layer may be formed. The conductive layer may be etched by using a gas including NF_3 and fluorocarbon. The conductive layer may be etched by using a gas including SiCl_4 and NF_3 . See col. 11, line 35 through col. 12.

The above-cited claims differ from Suzawa by specifying various compositions (e.g., ratio of the flow rate of etchant) and processing parameters (such as claim 3).

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However, same were known to be result effective variables (see Table I and II as evidence) and commonly determined by routine experiment. The process of conducting routine experimentations (optimizations) so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, which is different in kind and not merely in degree from the results of the prior art, A person having ordinary skill in the art would have found it obvious to modify admitted prior art by performing routine experiments (by using various compositions and different processing parameters) to obtain optimal result. Dependant claims 7,8, 10, and 11 differ from Suzawa by specifying various angles / dimensions of the etched product (e.g., angles between the etched conductive layer and the insulating layer). Same are merely a matter of choices of design depending on the product requirements, since same etchants are being used, it would be obvious to one skilled in the art to modify the process parameters so as to achieve the desired etch selectivity, and therefore various angles /dimensions of the etched product in order to accommodate the specific product design and meet the product requirement. See also col. 10, Table 1, Suzawa shows that said angle is a function of process parameters, for example, condition 1 produces 80 degree, and condition 4 produces 70 degree.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). *In re Woodruff*, 16USPQ2d 1934,1936 (Fed. Cir.1990); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.

" The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation where in a disclosed set of percent ranges is the optimum combination of percentages" *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed.Cir. 2003).

4. Claims 5, 9, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzawa et al. (US 6,773,996) in view of JP 2001-298193.

In a method for semiconductor device fabrication, Suzawa teaches that an insulating layer may be formed above a semiconductor layer. A conductive layer including at least one of a tantalum layer and a tantalum nitride layer may be formed. The conductive layer may be etched by using a gas including NF_3 and fluorocarbon. The conductive layer may be etched by using a gas including SiCl_4 and NF_3 . See col. 11, line 35 through col. 12.

Unlike the claimed invention, Suzawa does not disclose that a first tantalum nitride layer, body centered cubic lattice phase tantalum layer, and a second tantalum nitride layer may be formed and etched. In a method of semiconductor device fabrication, JP 2001-298193 (abstract; [0037]) teaches that a gate electrode of MOSFET may have the structure of a first tantalum nitride layer, body centered cubic lattice phase tantalum layer, and a second tantalum nitride layer. Suzawa teaches working a gate electrode by dry etching. Suzawa is not particular about the gate electrode being working on. Hence, it would have been obvious to one with ordinary skill in the art to work the structure of JP 2001-298193 in the process of Suzawa so as to form a gate electrode of MOSFET.

The above-cited claims differ from Suzawa by specifying various composition (e.g., ratio of the flow rate of etchant) and processing parameters (such as claim 5). However, same were known to be result effective variables and commonly determined by routine experiment. The process of conducting routine experimentations

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(optimizations) so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, which is different in kind and not merely in degree from the results of the prior art, a person having ordinary skill in the art would have found it obvious to modify admitted prior art by performing routine experiments (by using various compositions and different processing parameters) to obtain optimal result. Dependant claims 9 and 12 differ from Suzawa by specifying various angles / dimensions of the etched product (e.g., angles between the etched conductive layer and the insulating layer). Same are merely a matter of choices of design depending on the product requirements, since same etchants are being used, it would be obvious to one skilled in the art to modify the process parameters so as to achieve the desired etch selectivity, and therefore various angles /dimensions of the etched product in order to accommodate the specific product design and meet the product requirement. See also col. 10, Table 1, Suzawa shows that said angle is a function of process parameters, for example, condition 1 produces 80 degree, and condition 4 produces 70 degree.

Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical (i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). *In re Woodruff*, 16USPQ2d 1934,1936 (Fed. Cir.1990); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.

“ The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation where in a disclosed set of percent ranges is the optimum combination of percentages” *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed.Cir. 2003).

Response to Arguments

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5. Applicant's arguments filed September 22, 2005 have been fully considered but they are not persuasive.

Applicant has argued that Suzawa does not teach the ratio of the flow rates of etching gases, nor does Suzawa teach the angle between the etched surface and the surface of the insulating layer. It is not persuasive. As has been stated in the office action, the above-cited claims differ from Suzawa by specifying various composition (e.g., ratio of the flow rate of etchant) and processing parameters (such as claim 3). However, same were known to be result effective variables (see Table I and II as evidence) and commonly determined by routine experiment. The process of conducting routine experimentations (optimizations) so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, which is different in kind and not merely in degree from the results of the prior art, A person having ordinary skill in the art would have found it obvious to modify admitted prior art by performing routine experiments (by using various compositions and different processing parameters) to obtain optimal result. Dependant claims 7,8, 10, and 11 differ from Suzawa by specifying various angles / dimensions of the etched product (e.g., angles between the etched conductive layer and the insulating layer). Same are merely a matter of choices of design depending on the product requirements, since same etchants are being used, it would be obvious to one skilled in the art to modify the process parameters so as to achieve the desired etch selectivity, and therefore various angles /dimensions of the etched product in order to accommodate the specific product design and meet the product requirement. See also

col. 10, Table 1, Suzawa shows that said angle is a function of process parameters, for example, condition 1 produces 80 degree, and condition 4 produces 70 degree. See also the case law cited above.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

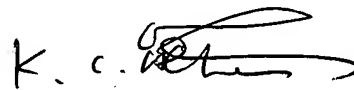
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's

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supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

October 27, 2005



Kin-Chan Chen
Primary Examiner
Art Unit 1765